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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,447	09/22/2003	Tsuyoshi Kaneko	116898	7312
25944	7590	03/10/2006	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			NGUYEN, PHILLIP	
			ART UNIT	PAPER NUMBER
			2828	

DATE MAILED: 03/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

5/1

<b>Office Action Summary</b>	<b>Application No.</b> 10/665,447	<b>Applicant(s)</b> KANEKO, TSUYOSHI	
	<b>Examiner</b> Phillip Nguyen	<b>Art Unit</b> 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 1-17 and 22.  
 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.  
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.  
     4a) Of the above claim(s) 18-21 is/are withdrawn from consideration.  
 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
 6) ☒ Claim(s) 1-10, 12-17 and 22 is/are rejected.  
 7) ☒ Claim(s) 11 is/are objected to.  
 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \* c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments with respect to claims 1-17 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-17 and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 5 recite " $m_1$ , a natural number" and " $m_2$ , a natural number" is not clear because sometimes 0 is also considered as natural number but when applied in the claim, the optical thicknesses of these mirrors become 0 or negative value.

Claim 3 recites "an aperture that is formed on the upper surface of the resonator, the emitting surface being formed within the aperture, and a reflectivity adjustment being formed on the emitting surface; a thickness of the reflectivity layer being uneven" which is not clear. First, it is not clear the structural relationship between the aperture with respect to the reflectivity adjustment layer since both of them are formed on the emitting surface.

Claim 13 fails to define “a first layer” with respect to the structure. It is suggested that to rewrite the claim such as --a first layer of the second mirror--. However, as shown in Fig. 1, reference number 110 is denoted as the reflectivity adjustment layer which is disposed directly on the upper surface of the mirror 104. The layer 110 is in alignment with layer 104 with direct contact with the mirror 104 completely in horizontal direction. It is not clear how the thickness of the reflectivity adjustment layer in an area close to the contact surface with a first layer being larger than that of the other area.

### *Claim Rejections - 35 USC § 102*

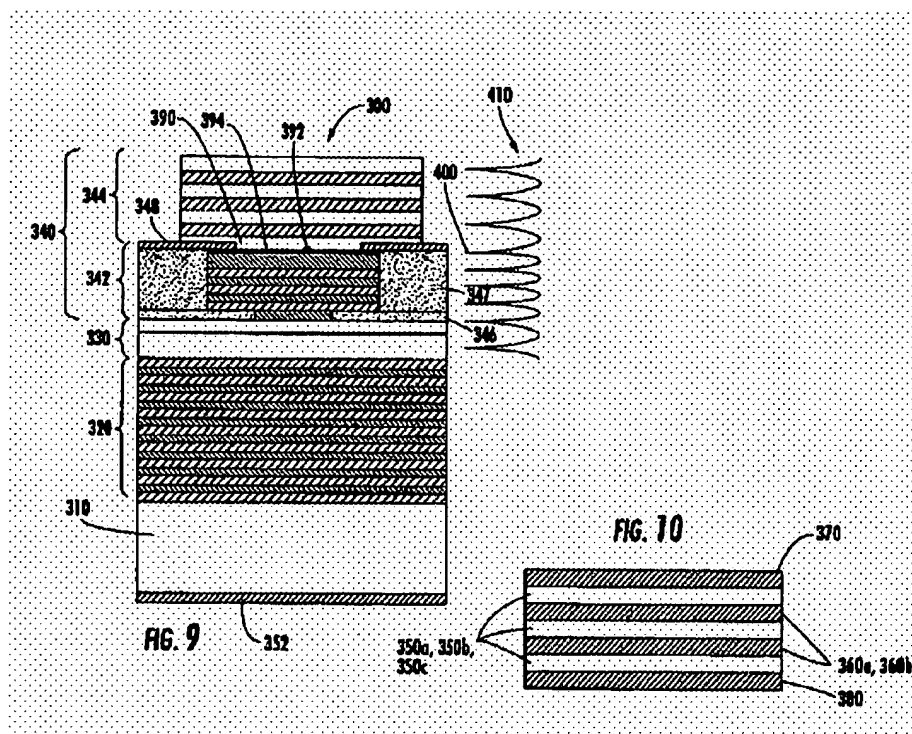
The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-2, 6-8, 10, 15-17, and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Wasserbauer et al. ('414).



With respect to claims 1 and 6, Wasserbauer discloses in Fig. 9-10 a surface emitting semiconductor laser including a resonator formed on a substrate 318 and emitting a laser beam toward a direction vertical to the substrate from an emitting surface formed on an upper surface of the resonator, the resonator including a first mirror 320 formed above the substrate; an active layer 330; and a second mirror 342 located oppositely to the first mirror and sandwiching the active layer therebetween; a reflectivity adjustment layer 344 that is formed on the emitting surface; the second mirror including a layer of which an optical thickness is  $m_1 \lambda/2$  ( $m_1$ , a natural number), when a wavelength of the laser beam is  $\lambda$ , and an optical thickness of the reflectivity adjustment layer being  $(2m_2 - 1)\lambda/4$  ( $m_2$ , a natural number) and the optical thickness is  $\frac{1}{2}$  wavelength constituting a top layer of the second mirror (see col. 10, lines 28-30 and lines 52-56.)

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With respect to claim 2, it is inherent that the reflectivity of the first region being higher than that of the second region since the first region include more layers of mirror such as layers 344.

With respect to claim 6, see col. 10, lines 52-56.

With respect to claim 7, since the reflectivity adjustment layer 344 being formed on the emitting surface of the laser, it is transparent to the laser beam so that the laser beam transmits through it to provide output.

With respect to claim 8-10, Wasserbauer discloses in the cross section of the laser; however, the plane configuration of the reflectivity adjustment layer should be a circle. Wasserbauer further discloses the reflectivity adjustment layer being arranged coaxially with a center axis of the emitting surface as shown in the same figure.

With respect to claim 15, see the Fig. 9.

With respect to claims 16-17, see Fig. 13 for an optical wave-guide and light transmission device with the laser as claim 1.

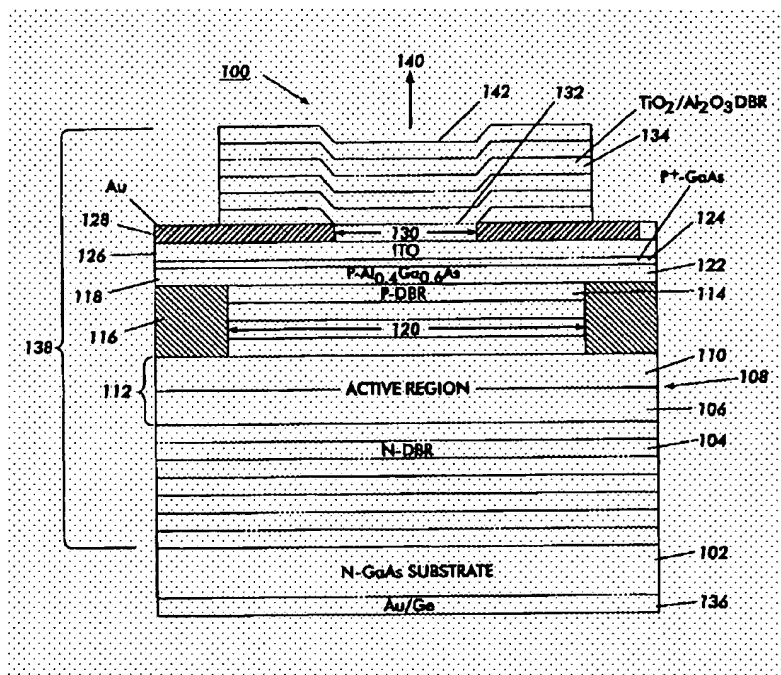
With respect to claim 22, Wasserbauer discloses the top layer of mirror 342 with the thickness of  $\frac{1}{2}$  wavelength being formed in the whole area of the second mirror 342, the reflectivity adjustment layer 344 being formed on a part of the mirror 342 because the electrode 348 is sandwiching in between.

4. Claims 1 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Johnson et al. ('900).

With respect to claim 1, Johnson discloses in Fig. 1-5 a surface emitting semiconductor laser including a resonator formed on a substrate 102 and emitting a laser beam toward a direction vertical to the substrate from an emitting surface formed on an upper surface of the resonator, the resonator including a first mirror 106 formed above the substrate; an active layer 108; and a second mirror 110 located oppositely to the first mirror and sandwiching the active layer therebetween; a reflectivity adjustment layer 132 that is formed on the emitting surface; the second mirror including a layer of which an optical thickness is  $m_1 \lambda/2$  ( $m_1$ , a natural number), when a wavelength of the laser beam is  $\lambda$ , and an optical thickness of the reflectivity adjustment layer being  $(2m_2 - 1)\lambda/4$  ( $m_2$ , a natural number) and the optical thickness is  $1/2$  wavelength constituting a top layer of the second mirror (see col. 7, lines 21-30).

With respect to claim 14, Johnson discloses the claimed invention with a different embodiment shown in Fig. 4 having substrate 402, first mirror 404, active layer 408, second mirror 420, and reflectivity adjustment layer 446. Johnson further discloses a current blocking layer 428 and 430 having a concentric circle-shaped plane, and area of an inside circle of the current aperture 432 is larger than a sectional area of the reflectivity adjustment layer 446.

5. Claims 3- 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Sun ('241).



With respect to claim 3, Sun discloses in the above figure a surface emitting semiconductor laser including a resonator formed on a substrate 102 and emitting a laser beam toward a direction 140 vertical to the substrate from an emitting surface formed on an upper surface of the resonator, comprising: a first electrode 128 and second electrode 136 that inject electric current into the resonator, at least a part of the first electrode being formed on the upper surface of the resonator; and an aperture 130 that is formed on the upper surface of the resonator, the emitting surface being formed within the aperture, and a reflectivity adjustment layer 134 being formed on the emitting surface; a thickness of the reflectivity layer being uneven.

With respect to claim 4, Sun discloses the resonator including a first mirror 104 formed above the substrate, an active layer 108, and a second mirror 114 located oppositely to the first mirror and sandwiching the active layer therebetween, and reflectivity of the laser beam in the first region being larger than that of a second region, when the first region is defined as a region comprising the reflectivity adjustment layer and a lower region of the reflectivity adjustment



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layer in the second mirror, and the second region is defined as a region except the first region in the second mirror. It is noted that the region that is equivalent size with reference 130 and below it is considered as the first region and the second is the area except the first region therefore it is inherent that the reflectivity of the first region has to be higher than that of the second region since the second region is blocked by the electrode 128 which produce no reflectivity.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sun ('241) in view of Wasserbauer et al. ('414). Sun discloses the claimed invention except for the claimed thickness of the second mirror and the reflectivity adjustment layer. Wasserbauer discloses the claimed invention as shown above with the claimed thickness of a layer of second mirror and the reflectivity adjustment layer. For the improvement of the laser, especially mode selection, it would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide the thickness as taught by Wasserbauer to Sun in order to suppress the undesired modes.

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7. Claims 9 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wasserbauer et al. ('414) in view of Sun ('241). Wasserbauer discloses the claimed invention except for the thickness of the reflectivity adjustment layer being uneven and the diameter of the reflectivity adjustment layer being equal to 6 microns or less. Sun discloses the uneven reflectivity adjustment layer as recited above and the diameter of the reflectivity adjustment layer (or at least the area reflectivity being adjusted) about 5 microns. For the improvement of the single mode laser, it would have been obvious to the one having ordinary skill in the art at the time the invention was made to provide the uneven thickness of the reflectivity adjustment layer with the diameter less than 6 microns because it is well known in the art.

***Allowable Subject Matter***

8. Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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***Communication Information***

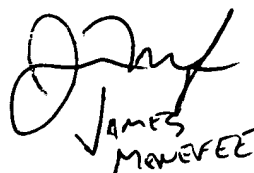
9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phillip Nguyen whose telephone number is 571-272-1947. The examiner can normally be reached on 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MINSUN HARVEY, can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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JAMES  
MAWEFEE